

CHAPTER SEVEN: WATER QUALITY

7.1 INTRODUCTION

Water quality is an important component of Pinal Active Management Area (PAMA) water supply management. The Arizona Department of Water Resources' (ADWR) role in water quality relates to the impacts of water quality on available water supplies. Protecting and managing water quality maximizes the overall quantity of usable water, and matching the best use to the quality of water is a significant aspect of meeting ADWR's water management objectives. This chapter describes ADWR's role and authority in meeting groundwater quality management objectives during the fourth management period and addresses water quality impacts on water supply management in the PAMA.

During the fourth management period, ADWR will continue to play a role in water quality challenges. ADWR's groundwater quality responsibilities include support of groundwater quality protection programs, assistance in the clean-up of contaminated areas, and assistance in matching water quality with the highest beneficial use.

In general, groundwater in the PAMA is of acceptable quality for most uses. Most of the groundwater supplies in the PAMA meet federal and state drinking water standards, though a small number of wells have exceeded the US Environmental Protection Agency (EPA) National Primary Drinking Water Regulation limits (See <http://water.epa.gov/drink/standardsriskmanagement.cfm>) for nitrates and fluoride. There are no Water Quality Assurance Revolving Fund (WQARF) sites, or US EPA National Priorities List (NPL) sites in the PAMA.

7.2 GOALS AND OBJECTIVES

As the agency entrusted with managing and conserving Arizona's long-term water supplies, ADWR will ensure that use of groundwater withdrawn to achieve remedial action objectives is minimized and, where practicable, new groundwater uses are not created and groundwater supplies are conserved. While ADWR believes that it is possible to both achieve reductions in withdrawals of groundwater and provide incentives for the use of remediated groundwater, it recognizes that there is a delicate balance between the two responsibilities that will involve coordinated efforts between the Arizona Department of Environmental Quality (ADEQ) and ADWR to ensure that, on a case-by-case basis, no more groundwater is withdrawn than is necessary.

To implement its groundwater quality management responsibilities, ADWR will "coordinate and confer" with ADEQ regarding "water plans, water resource planning, water management, wells, water rights and permits, and other appropriate provisions of Title 45 pertaining to remedial investigations, feasibility studies, site prioritization, selection of remedies and implementation of the WQARF program pursuant to title 49, chapter 2, article 5" (A.R.S. § 45-105(B)(4)(c)).

ADWR's goals and objectives for groundwater quality management for the fourth management period are the following:

- to ensure that remediation of contaminated groundwater uses the minimal amount of groundwater necessary to facilitate the objectives of each remedial action project; and
- to ensure that end uses of remediated groundwater minimize groundwater withdrawals and are consistent with the PAMA goal. To this end, ADWR will favor end uses that minimize changes in groundwater storage such as reinjection and recharge over those that reduce groundwater in storage. Where remediated groundwater cannot be practicably or cost-effectively reinjected or recharged, ADWR will encourage replacing existing groundwater uses with remediated water; and discourage

new permanent uses which would not have occurred without the poor quality groundwater accounting and which would continue to rely on groundwater after the poor quality groundwater is no longer available.

ADWR's objectives are designed to ensure that remedial action projects are not an impediment to achieving the water management goal for the PAMA and that remedial actions are performed in a prudent and efficient manner from a water management perspective.

7.3 STATUTORY PROVISIONS

While ADEQ is the agency primarily responsible for regulating water quality in Arizona, ADWR also has certain limited responsibilities in this area. Statutory provisions pertaining to ADWR's limited authority to regulate groundwater quality are discussed below.

The 1980 Groundwater Code (Code) grants ADWR authority to regulate groundwater. Under the Code, ADWR has the following authority and responsibilities relating to water quality:

- “The director may . . . formulate plans and develop programs for the practical and economical development, management, conservation and use of surface water, groundwater and the watersheds in this state, including the management of water quantity and quality” (A.R.S. § 45-105(A)(1)).
- “The director may . . . conduct feasibility studies and remedial investigations relating to groundwater quality and enter into contracts and cooperative agreements under § 104 of the comprehensive environmental response, compensation, and liability act [CERCLA] of 1980 (P.L. 96-510) to conduct such studies and investigations” (A.R.S. § 45-105(A)(15)).
- For the fourth management period, the Director “may include in each plan, if feasible, in cooperation with the department of environmental quality, an assessment of groundwater quality in the active management area and any proposed program for groundwater quality protection. Any such program shall be submitted to the legislature for any necessary enabling legislation or coordination with existing programs of the department of environmental quality” (A.R.S. § 45-567(A)(6)).
- “The director shall consult with the department of environmental quality on water quality considerations in developing and implementing management plans under this article” (A.R.S. § 45-573).

WQARF legislation, enacted in 1997 and amended in 1999, expanded ADWR's role in water quality management. ADWR's responsibilities and authority under WQARF include:

- “The director of water resources, in consultation with the director of environmental quality, may inspect wells for vertical cross-contamination of groundwater by hazardous substances and may take appropriate remedial actions to prevent or mitigate the cross-contamination...” (A.R.S. § 45-605(A)).
- “The director shall notify an applicant for a permit or a person who files a notice of intent to drill a new or replacement well if the location of the proposed well is within a sub-basin where there is a site on the registry established pursuant to section 49-287.01, subsection D...” The Director shall also adopt rules requiring the review of notices and applications regarding new or replacement

wells to identify whether a well will be located where existing or anticipated future groundwater contamination presents a risk of vertical cross-contamination by the well. The rules shall require that a new or replacement well in these types of location be designed and constructed in a manner to prevent cross-contamination with an aquifer (A.R.S. § 45-605(E)).

- “The director of environmental quality and the director of water resources shall coordinate their efforts to expedite remedial actions, including obtaining information pertinent to site investigations, remedial investigations, site management and beneficial use of remediated water” (A.R.S. § 49-290.01(C)).
- “On consultation with the director of environmental quality, the director of water resources may waive its applicable permits, approvals or authorizations if the director of water resources determines that the permits, approval or other authorization unreasonably limits the completion of a remedial action and if the waiver does not conflict with the statutory intent of the permit, approval or other authorization” (A.R.S. § 49-290.01(A)). The director of water resources may also waive any regulatory requirement adopted pursuant to Title 45 with respect to a site or portion of a site as part of a record of decision adopted pursuant to section 49-287.04 for that site or portion of a site if the regulatory requirement conflicts with the selected remedy, provided that the waiver does not “result in adverse impacts to other land and water users” (A.R.S. § 49-290.01(D)).
- “The department of water resources shall include in its management plans... provisions to encourage the beneficial use of groundwater that is withdrawn pursuant to approved remedial action projects...” (1999 Ariz. Sess. Law, H.B. 2189, § 51(A)). In order to encourage the beneficial use of remediated groundwater, “the department of water resources shall account for groundwater withdrawn pursuant to approved remedial action projects under CERCLA or Title 49, Arizona Revised Statutes, except for groundwater withdrawn to provide an alternative water supply pursuant to section 49-282.03, Arizona Revised Statutes, consistent with the accounting for surface water” for purposes of determining compliance with management plan conservation requirements (1999 Ariz. Sess. Law, H.B. 2189, § 51(B)).
- “For each calendar year until 2025, the use of up to an aggregate of sixty-five thousand acre-feet (ac-ft) of groundwater withdrawn within all active management areas pursuant to approved remedial action projects under CERCLA or Title 49, Arizona Revised Statutes, except for groundwater withdrawn to provide an alternative water supply pursuant to section 49-282.03, Arizona Revised Statutes, shall be considered consistent with the management goal of the active management area as prescribed in A.R.S. § 45-576(J)(2), Arizona Revised Statutes (1999 Ariz. Sess. Law, H.B. 2189, § 52(A)).

For the fourth management period, “twenty-five percent of the total volume of groundwater “withdrawn pursuant to approved remedial action projects under CERCLA or title 49, Arizona Revised Statutes, except for groundwater withdrawn to provide an alternative water supply pursuant to section 49-282.03, Arizona Revised Statutes, in excess of the aggregate volume of sixty-five thousand ac-ft of groundwater authorized in subsections A and C of this section shall be considered consistent with the management goal of the active management area as prescribed in section 45-576 (J)(2), Arizona Revised Statutes ...” (1999 Ariz. Sess. Law, H.B. 2189, § 52(B)).

- “The department of environmental quality and the department of water resources shall develop a method of sharing data, including cooperative data base development and integration between the

departments that will provide the departments with the information necessary to protect the resources of the state” (1997 Ariz. Sess. Law, S.B. 1452, § 44(A)).

- “The directors of environmental quality and water resources shall enter into an agreement to coordinate the well inspection and remediation programs and to rank wells within an area of contamination according to each well’s potential to act as a conduit to spread contamination and to determine the appropriate remedial action regarding the wells with a potential to act as a conduit, including well reconstruction, well abandonment or no action” (1997 Ariz. Sess. Law, S.B. 1452, § 45(A)). Per S.B. 1465 (1997 Session Laws) §45(B), ADEQ and ADWR were required to establish rules with procedures to provide affected well owners with “the opportunity to comment on departmental investigations and remedial actions involving vertical cross-contamination” and “provide that well owners with wells with the highest potential to act as a conduit to spread contamination be notified of the status of these wells.” This was accomplished in A.A.C. R12-15-850(A) and (B). See also, A.A.C. R12-15-812 and 821.

7.4 THE REGULATION OF GROUNDWATER QUALITY IN ARIZONA

To understand ADWR’s role in regulating groundwater quality, it is important to understand the broad framework of laws and programs impacting both groundwater and surface water quality. Since groundwater quantity and quality challenges are interrelated, ADEQ and ADWR work together to prevent and mitigate groundwater quality and quantity challenges. ADEQ has the primary responsibility for protecting the State’s groundwater and surface water quality, while ADWR secondarily manages groundwater quality concerns. This section discusses the regulatory agencies responsible for administering laws impacting groundwater and surface water quality as well as the federal laws and state programs impacting groundwater and secondarily surface water quality.

7.4.1 Water Quality Regulatory Agencies

Water quality protection programs in Arizona are based on both federal and state law and are primarily administered by either ADEQ or the US Environmental Protection Agency (EPA) Region IX. ADEQ has the responsibility to administer state water quality programs pursuant to state statutes and to administer federal water quality programs for which the EPA has delegated its authority to the state, referred to as state primacy. EPA has the responsibility to administer federal water quality programs pursuant to federal statutes. The EPA delegates its authority to states where the state demonstrates that it can adequately administer the program and the federal statute provides for the delegation of the authority.

ADEQ has authority pursuant to the Environmental Quality Act (EQA) of 1986 (A.R.S. § 49-101 *et seq.*) to set water quality standards and to regulate discharges that have the potential to impact the quality of groundwater by requiring such discharges to be made only subject to an aquifer protection permit (APP).

ADEQ has authority under the Clean Water Act (CWA) to set Arizona’s surface water quality standards and to certify that discharges subject to federal permits do not violate state water quality standards.

EPA Region IX delegated authority to administer the CWA National Pollutant Discharge Elimination System (NPDES) permit and the pretreatment program to Arizona in 2002. The ADEQ program is a point source discharge permitting program and is called the Arizona Pollutant Discharge Elimination System (AZPDES). The United States Army Corps of Engineers (Corps), Los Angeles District, retains authority to administer CWA permits for the discharge of dredge or fill materials in Arizona’s waters. EPA Region IX also has authority to require groundwater monitoring and remediation in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

7.4.2 Federal Laws Impacting Groundwater Quality

The Safe Drinking Water Act (SDWA) is the primary federal law regulating drinking water quality which includes groundwater. The CWA, which regulates surface water, also impacts groundwater quality. CERCLA and the Resource Conservation and Recovery Act (RCRA) impact groundwater management through the regulation of hazardous waste and sites contaminated by hazardous waste. The following is a brief overview of these federal laws and their impacts on ADWR's water quality management.

7.4.2.1 Safe Drinking Water Act

The SDWA was enacted in 1974 to regulate drinking water. ADEQ has been delegated authority by the EPA to implement the SDWA and "to ensure that all potable water distributed or sold to the public through public and semi-public water systems is free from unwholesome, poisonous, deleterious, or other foreign substances and filth or disease causing substances or organisms" (A.R.S. § 49-351(A)).

Although ADWR does not regulate drinking water quality, the presence of contaminants in groundwater may negatively impact water quality for municipal providers and poses potential water management challenges for drinking water systems.

7.4.2.2 Clean Water Act

The CWA, first passed in 1972, is the comprehensive federal statute regulating surface water quality. It provides for area-wide, long-range planning processes to mitigate water quality control problems in selected areas which result from urban and industrial wastewater. Because such planning processes provide a comprehensive review of wastewater treatment and reuse options, ADWR participates in such planning and provides technical assistance to local councils of government who administer the plans.

7.4.2.3 Comprehensive Environmental Response, Compensation and Liability Act

CERCLA and the Superfund Amendments and Reauthorization Act, commonly referred to as the Federal Superfund program, authorize investigation and remediation of groundwater contaminated by releases of hazardous substances. In Arizona, CERCLA establishes a comprehensive response program which is administered by ADEQ in cooperation with the EPA. ADWR also plays an advisory role in this process, and regularly participates in CERCLA program activities. ADWR's concern regarding CERCLA sites is that any groundwater that is withdrawn and remediated must be put to reasonable and beneficial use. ADWR may participate on CERCLA technical committees and serve in an advisory capacity for monitoring and extraction well installation, source control projects, and permitting.

7.4.2.4 Resource Conservation and Recovery Act

RCRA established a national hazardous waste management program in 1976. Under RCRA, hazardous waste permits are issued for the treatment, storage, and disposal (TSD) of hazardous wastes. Individual permits issued to these facilities specify design, performance, and operational standards which include groundwater monitoring. Hazardous waste facilities also undergo a closure process once operations are reduced or terminated. Moreover, corrective action may be required at TSD facilities and may include groundwater monitoring and remediation.

ADEQ has been delegated authority for the implementation of RCRA requirements in Arizona. ADWR's participation at RCRA sites is important for water management activities, particularly in regard to well siting, use permits, and end use issues.

7.4.3 ADEQ Programs that Impact ADWR Groundwater Quality Activities

The EQA established the ADEQ and created a strong and comprehensive water quality management structure. ADEQ's programs that protect groundwater resources include water quality assessments, groundwater monitoring, pollutant discharge, permitting activities, and remediation activities. The

following are selected water quality protection programs which fall under the jurisdiction of ADEQ and have a direct impact on ADWR activities.

7.4.3.1 Aquifer Protection Program

The most comprehensive ADEQ groundwater protection program is the Aquifer Protection Program (APP), established by the EQA in 1986 and implemented by rule in 1989. An individual or general permit is required for any person who discharges or who owns or operates a facility that discharges a pollutant from a facility either directly into an aquifer or to the land surface or the vadose zone in such a manner that there is a reasonable probability that the pollutant will reach an aquifer (A.R.S. §§ 49-201(11), 49-241).

ADWR may coordinate with ADEQ to review APP applications for potential harmful water quality impacts on groundwater conditions. ADEQ advises ADWR of each APP application received for a facility that is an underground storage and recovery project. One of the conditions for the issuance of an underground storage facility permit is that ADEQ must determine that the facility is not in a location which will result in pollutants being leached to the groundwater table so as to cause unreasonable harm (A.R.S. § 45-811.01(C)). Facilities exempt from APP provisions may be required by ADWR, in consultation with ADEQ, to meet other requirements to mitigate harmful water quality impacts to the aquifer.

7.4.3.2 Wellhead Protection Program

An important addition to Arizona's groundwater protection program has been the development of the Wellhead Protection Program which fulfills federal requirements of section 1428 of the SDWA by designating Wellhead Protection Areas around public drinking water systems. The Wellhead Protection Program is a voluntary program which encourages the protection of all wells, not just public drinking water system wells. Local entities that have the authority to control land use and exercise other management options can implement wellhead protection, therefore encouraging the creation of local programs.

7.4.3.3 Reuse Permits

Reuse permits are issued by ADEQ to facilities which provide wastewater for reuse. A reuse permit specifies the amount of reclaimed water to be reused and its chemical quality. ADEQ wastewater reuse rules (A.A.C. R18-9-701 *et seq.*) set the criteria for the use of treated effluent, or reclaimed water, for purposes such as agricultural irrigation, turf irrigation, and recharge. The current reuse rules prescribe numeric reclaimed water quality criteria and monitoring requirements for specific reuse applications. In general, these rules prescribe allowable limits for pH, total fecal coliform, turbidity, enteric viruses, and certain parasites. Reuse may be limited depending on the quality of source water and the intended use.

Wastewater reuse rules undergo periodic updating through ADEQ's rule making process. ADWR reviews any proposed changes to the wastewater reuse rules to ensure the protection of public health and groundwater supplies while maximizing the use of a significant renewable water supply. ADWR evaluates reclaimed water reuse permits issued by ADEQ and encourages the use of treated reclaimed water where appropriate.

7.4.3.4 Underground Storage Tanks

ADEQ's Underground Storage Tank (UST) program was developed to ensure the proper operation of underground storage tanks and to prevent and remediate releases. Under state regulation and RCRA amendments, the UST program consists of notification requirements, technical standards for new and existing USTs, leak detection and closure criteria, corrective actions for remediation, and financial responsibility demonstrations. Leaking USTs in a concentrated area can present detrimental impacts on groundwater quality and supplies.

ADWR has the authority to issue poor quality groundwater withdrawal permits for water contaminated by leaking USTs. ADWR can provide guidance for leaking UST site remediation projects to ensure the beneficial use of remediated water.

7.4.3.5 Water Quality Assurance Revolving Fund

The WQARF Program, sometimes referred to as the state Superfund program, was created as part of the EQA. WQARF monies are used to protect the waters of our state against hazardous substances, and may be used in conjunction with federal funds. Funds can be used for statewide water quality monitoring, health and risk assessment studies, and remediating hazardous substances which threaten the waters of the state. Mitigation of non-hazardous substances is also allowed under specified conditions (A.R.S. § 49-286). ADEQ has developed a list of environmentally threatened sites which qualify for WQARF monies. Funds are used at those sites to mitigate existing contamination or to prevent further spread of pollutants which may threaten Arizona's water supplies. A registry of sites is maintained by ADEQ. Sites are added to the registry based on criteria such as the degree of risk to the environment and other available funding sources.

ADEQ follows a process for management and cleanup of WQARF sites that consists of site identification and characterization, site prioritization, remedy selection, identification of end uses, implementation and monitoring, and closure. ADWR will coordinate with ADEQ in the planning and implementation of any groundwater cleanup actions under WQARF in the PAMA.

7.4.3.6 Water Infrastructure Finance Authority

In 1989, the Arizona Legislature created the Wastewater Management Authority to administer funds granted to the state pursuant to the federal SDWA. These funds, which required a 20 percent state match, are loaned to wastewater treatment systems in the state for assistance in meeting requirements of the SDWA. ADEQ made loans for this purpose from monies in the ADEQ wastewater treatment revolving fund. In 1997, this administrative body was amended by the Legislature and renamed the Water Infrastructure Finance Authority (WIFA).

The authority for WIFA was expanded to make loans available to drinking water systems in addition to wastewater treatment systems for assistance in meeting requirements of the SDWA. ADWR is required to participate on the advisory board that oversees the WIFA and has an interest in viability of water systems and SDWA compliance (A.R.S. § 49-1202(A)(8)).

7.4.4 ADWR Programs Related to Groundwater Quality

ADWR protects groundwater quality by considering groundwater quality issues in its permitting process and water quantity management programs. As a result of WQARF reform legislation of 1997, ADWR has increased its responsibility in its program to coordinate and provide assistance with WQARF activities. Among other things, the legislation provides for:

- annual funding for ADWR WQARF activities;
- database development and coordination with ADEQ;
- groundwater withdrawn pursuant to certain cleanups to be accounted for in the same manner as surface water for the purpose of determining compliance with conservation requirements;
- amendment of the Assured Water Supply (AWS) Rules;
- advisory participation by ADWR in site assessment, remediation, management, operation, and planning strategies;
- a WQARF Advisory Board on which ADWR has a seat; and
- a well inspection program through which wells that are contributing to vertical cross-contamination may be identified and modified.

ADWR's existing permits and programs which consider groundwater quality protection are discussed in the following section.

7.4.4.1 Poor Quality Groundwater Withdrawal Permits

Appropriate use of contaminated groundwater conserves the existing supply of potable groundwater. ADWR issues poor quality groundwater withdrawal permits to allow the withdrawal of groundwater which, because of its quality, has no other beneficial use at the present time. A.R.S. § 45-516. Withdrawal permits are issued by ADWR, and the withdrawal must be consistent with the AMA management plans. Permits are usually issued in conjunction with CERCLA, WQARF, or leaking UST sites for pump-and-treat operations. To increase the appropriate uses of poor quality groundwater during the fourth management period, ADWR will continue to encourage matching poor quality groundwater with beneficial uses within the AMA.

As of 2015, there are no poor quality groundwater withdrawal permits in the PAMA.

7.4.4.2 Assured Water Supply Program

The Assured Water Supply (AWS) Program is a consumer protection program that ensures that new subdivisions have a secure supply of water with adequate quality for at least 100 years. Pursuant to A.R.S. § 45-576, before land may be subdivided, the developer of the property must either obtain a Certificate of Assured Water Supply for the subdivision from ADWR, or a written commitment of water service for the subdivision from a city, town, or private water company with a Designation of Assured Water Supply (DAWS).

Pursuant to rules governing the AWS Program set forth in A.A.C. R12-15-701 *et seq.*, in order to establish an AWS, the applicant must prove that a supply of water is physically, legally, and continuously available for the 100-year period to meet the demands of the development that will be the subject of the AWS determination. In the case of a designation, the water supply must meet current and committed demands of the water provider for the 100-year period in addition to the projected demands of the new development. The applicant must also establish that projected water use will be consistent with achievement of the management goal for the active management area and that the applicant has the financial capability to construct the physical facilities necessary to serve the development. In addition, the applicant must establish that the water supply pledged for assured water supply purposes is of adequate quality.

In assessing the quality of a water supply pledged for AWS purposes, ADWR works closely with ADEQ to determine whether the water supply meets ADEQ standards for the purposes for which the water is pledged. If the water is not of adequate quality, the applicant may need to find alternative water sources or to expend additional resources treating the water to meet the ADEQ standards.

As of 2015, there were five municipal water providers that hold DAWS in the PAMA. (*See http://www.azwater.gov/azdwr/WaterManagement/AAWS/documents/documents/List_of_Designated_Providers_5-28-2013.pdf for a list of providers who hold a DAWS in the PAMA.*)

7.4.4.3 Underground Water Storage and Recovery Program

Underground water storage, commonly referred to as artificial recharge, plays an important role in achieving the PAMA's water management goal. Recharge projects store renewable supplies such as Central Arizona Project (CAP) water and reclaimed water that is currently not used directly. Credits for recharged water are then available to water providers and developers to help meet the various requirements for an AWS. Other stored CAP water, particularly that water stored underground by the Arizona Water Banking

Authority (AWBA), will be available to protect municipal and industrial CAP users from future shortages or outages on the CAP system.

The underground water storage program is administered by ADWR. Permits must be obtained from ADWR prior to undertaking recharge activities. ADWR coordinates closely with ADEQ to ensure that underground water storage does not adversely impact existing aquifer water quality and does not cause movement of existing groundwater contamination. If reclaimed water is stored underground, the applicant must obtain an APP from ADEQ, in addition to the underground storage permits required from ADWR. APPs specify monitoring requirements to assure that recharge waters are not negatively impacting the native groundwater. An APP is not required to store CAP water underground (A.R.S. § 49-250(B)(13)).

As of 2016, the PAMA has 15 permitted recharge facilities. Twelve are Underground Storage Facilities (USFs) and three are Groundwater Savings Facilities (GSFs). For more information on recharge facilities in the PAMA see Chapter 8 of this plan. There are 29 long-term storage account holders with total recoverable balances totaling approximately 2.9 million ac-ft as of 2015. The potential volume recoverable per year pursuant to recovery well permits is variable.

7.4.4.4 Well Spacing/Impact Analysis

A.R.S. § 45-598 and ADWR's Well Spacing Rules (R12-15-1301 *et. seq.*) are in place to prevent unreasonable increasing damage to surrounding land or other water users due to the concentration of wells in an AMA. Specifically, these rules require well impact studies to evaluate the potential for new non-exempt wells and new withdrawals to cause damage to land and other water users. An applicant may submit a hydrologic report to demonstrate the proposed well's impact on surrounding wells, but is not automatically required to do so. The Director may require the applicant to submit a hydrologic report if it is needed for the Director to make a determination under the rules. The well permit application may be denied if ADWR determines that the proposed well will cause an unreasonable increasing damage on surrounding wells, additional regional land subsidence, or migration of poor quality groundwater.

The Notice of Intention to Drill a well statute (A.R.S. § 45-596) was modified in 2006 to allow the Director to deny the authority to drill a well if the Director determines that withdrawals from the well will cause the migration of contaminated groundwater from a remedial action site to another well, resulting in unreasonably increasing damage to the owner of the well, or persons using water from the well. The statute specifies that the Director shall use the same applicable criteria in the Well Spacing Rules used for wells inside of the AMA in making this determination.

7.4.4.5 Well Construction and Abandonment Requirements and Licensing of Well Drillers

If wells are not constructed, sealed, or abandoned properly they may act as conduits for contaminant flow from the surface to groundwater or between aquifers. ADWR's rules governing well construction, abandonment, and driller licensing, set forth at A.A.C. R12-15-801 *et. seq.*, are summarized below.

- Minimum well construction and abandonment requirements prevent entry of fluids at and near the surface and minimize the possibilities of migration and inadvertent withdrawal of poor quality groundwater. These requirements also prohibit the use of hazardous materials in the construction of wells.
- Installation, modification, abandonment, or repair of all wells in Arizona must be performed by a driller licensed by ADWR. The licensing procedure includes the administration of written examinations to test the applicant's knowledge of state regulations, hydrologic concepts, and well construction principles and practices.

- Disposal site restriction prevents the use of wells as disposal facilities for any material that may pollute groundwater.
- Special standards may be required by ADWR if the minimum well construction requirements do not adequately protect the aquifer or other water users.
- Open wells must be capped with a water-tight steel plate.
- Except for monitor and piezometer wells, no well shall be drilled within 100 feet of any septic tank system, sewage disposal area, landfill, hazardous waste facility or storage area, or petroleum storage areas and tanks, unless authorized by the Director.

Wells drilled prior to the enactment of the Well Construction Rules (effective March 5, 1984) were not required to be constructed in accordance with minimum well construction standards. If a pre-rule well is replaced or modified, however, the new or modified well must meet the current well construction standards. (A.R.S. § 45-594.)

7.4.4.6 ADWR's Role in the WQARF Site Cleanup and Management Program

The sections below describe ADWR's role and activities in implementing the Water Quality Assurance Revolving Fund (WQARF) Program.

Site Identification, Prioritization, and Characterization

Existing WQARF sites are being managed by ADEQ. Additional sites may be identified in the future based on a preliminary investigation by ADEQ to determine the potential risk to public health, welfare, or the environment. The results of the preliminary investigation will be used by ADEQ for site scoring using a method to be established in rules adopted by the director of ADEQ. The completed preliminary investigation will be used by ADEQ to either make a determination of no further action on a site, or to prepare the site for inclusion on the Site Registry. In this latter case, a Site Registry report is prepared containing a description of the site, with its geographical boundaries indicated, and the site score.

After a site is added to the Registry, characterization is important because the nature and extent of contamination must be understood before remedies can be selected and implemented. An important part of site characterization is an evaluation of how contamination impacts current and future groundwater uses.

ADWR will assist ADEQ by providing resource data such as well location and groundwater withdrawal records, water rights information, and any other appropriate data recorded by ADWR. Other ADWR roles may include activities such as site inspections and evaluations, review of investigations, field work such as well inspection, identification of potential water management challenges, and any other characterization as appropriate. ADWR computer models may be useful in characterizing groundwater flow patterns.

Remedy Selection

ADEQ has established a list of response actions to be considered when managing a site. Based on the potential impact on current and future water uses, a potential remedy must be evaluated and designed. Each remedy is site-specific. ADWR may assist in defining potential remedies to ensure that the remedy is consistent with ADWR management plans and sound groundwater management practices that are publicly acceptable. Ultimately, ADWR's level of assistance will vary based on the remedy selected.

ADWR is committed to the beneficial use of groundwater withdrawn and treated at WQARF sites and will assist ADEQ with the identification and facilitation of designated end uses for remedial projects. These end

uses should be consistent with those determined for existing sites as well as the development of new end uses to match the intended use.

Implementation and Monitoring

The implementation and monitoring phase of a site activity includes construction, startup, monitoring, operation and maintenance, and any other appropriate activities. ADWR will assist ADEQ in this phase through the following activities where appropriate: field work, review of groundwater analyses, appropriate accounting for AWS determinations and for determining compliance with conservation requirements, and any other appropriate activities.

Site Closure

ADEQ must certify that site goals have been attained in order to discontinue cleanup activities. ADWR staff assists in evaluation of sites and certification of site closure. ADWR assists and may need to identify alternative water sources to replace remediated water when sites are closed.

ADWR Policies for WQARF and Other Applicable Site Cleanup and Management

In general, site plans should be consistent with the management goal of the AMA in which the site is located (A.R.S. §§ 49-282.06(F)). During the fourth management period ADWR will continue to cooperate with ADEQ on the cleanup up remedial sites. ADWR policies are geared towards ensuring that AMA goals are addressed when remedial actions are planned. ADWR generally supports proposed remedial projects that make sense from a groundwater management perspective. The principles which formulate these policies are described below.

- ***Water use should be consistent with water allocation concepts in Title 45***
This policy requires that entities using water withdrawn pursuant to cleanups, whether under CERCLA, WQARF, RCRA, voluntary, or other sites, possess groundwater withdrawal authority, such as permits or water rights.
- ***ADWR supports source control cleanups to protect water sources***
Source control, which controls pollution at its source, can be a cost effective and practical approach to cleanups. Many wells have been rendered unsuitable for direct potable use due to migrating contamination. Source control projects to protect wells that are threatened by contaminant migration are generally supported by ADWR.
- ***Any groundwater withdrawn must be put to reasonable and beneficial use***
Reasonable and beneficial use of groundwater withdrawn is a policy that applies to all cleanups. Any withdrawals of 100 ac-ft or less annually may qualify for *de minimis* status and be exempted from beneficial use requirements, but ADWR will evaluate *de minimis* exemptions from this policy on a case-by-case basis. In the case of leaking UST sites, ADWR generally exempts sites that annually pump only a small volume of water.
- ***Contaminated groundwater represents an important potential water resource***
Even if groundwater is contaminated, it represents a resource that can be potentially be used for both potable and non-potable uses. Potable uses must meet the state and federal drinking water standards that govern public consumption of potable water. ADEQ and the Arizona Department of Health Services intend to develop end use standards for non-potable uses that, if implemented, will make large volumes of groundwater usable again. ADWR will cooperate in the development of non-potable end use standards and will develop policies for appropriate end uses based on the new standards.

ADWR does not encourage containment remedies that involve massive groundwater withdrawals to achieve regional groundwater flow control from a water management standpoint.

Statutory Mandates for ADWR's Participation in the WQARF Program

The WQARF reform legislation enacted in 1997 and emended in 1999 mandates that ADWR implement certain water quality programs and provides for expanded ADWR involvement in water quality management. 1999 Ariz. Sess. Law, H.B. 2189, §§ 51 and 52 ADWR programs and responsibilities based on the WQARF reform legislation include the following:

- Coordination with ADEQ in Evaluating Proposed Remedial Actions - Pursuant to A.R.S. § 45-105(B)(4)(c), ADWR is required to coordinate and confer with ADEQ in evaluating proposed remedial actions to provide ADEQ with information regarding water resource considerations. ADWR will coordinate and confer with ADEQ prior to ADEQ's approval or denial of proposed remedial action plans. Once a remedial action plan is approved by ADEQ or the EPA pursuant to CERCLA or Title 49, Arizona Revised Statutes, ADWR will account for remediated groundwater in accordance with Laws 1997, Ch. 287, §§ 51 and 52. Among other things, ADWR will consider the following factors relating to proposed remedial actions in its recommendations to ADEQ:
 - Volume of remediated groundwater to be withdrawn - ADWR will encourage remedial actions that use the least amount of groundwater necessary to facilitate a project's remedial goal and will discourage remedial actions that are not prudent and efficient from a groundwater management perspective.
 - End uses to which remediated groundwater will be put - ADWR will encourage end uses that minimize groundwater withdrawals and that are consistent with the AMA water management goal because they will result in no change in groundwater storage. Where remediated groundwater cannot be practicably or cost-effectively re-injected or recharged, ADWR will encourage replacing existing groundwater uses with remediated groundwater and discourage new permanent uses which would not have occurred without the incentive to use remediated groundwater and which would continue to rely on groundwater after the remediated groundwater is no longer available.
 - While circumstances will be evaluated on a case-by-case basis, ADWR has adopted a substantive policy listing end use preferences (*See: <http://www.azwater.gov/AzDWR/Legal/LawsRulesPolicies/SubstantivePolicyStatement.htm>, policy GW38, "Remediated Groundwater Incentives for Conservation Requirement Accounting for the Second Management Plan"*). Those preferences, listed in order from most to least preferred based on the impact on the active management area's management goal and the amount of groundwater in storage:

Neutral to local aquifer

- a. Re-inject or recharge in the same local area.
- b. Replace existing groundwater uses in the same local area.

Neutral to groundwater basin

- c. Re-inject or recharge in the same active management area.
- d. Replace existing groundwater uses in the same active management area.

Reduce groundwater in storage

- e. Replace existing non-groundwater use in the same active management area.

- f. Beneficial uses of water for new purposes.
 - g. Artificial wetlands or artificial lakes.
 - h. Dispose to the sewer (unless the resulting reclaimed water is re-injected, recharged or replaces an existing groundwater use).
- Achievement of maximum beneficial use of waters and viability of proposed remedial action
- Remedial actions must assure the protection of public health and welfare and the environment; to the extent practicable, provide for the control, management or cleanup of hazardous substances so as to allow the maximum beneficial use of the waters of the state; and be reasonable, necessary, cost-effective, and technically feasible (A.R.S. § 49-282.06(A)).
- Consistency with Title 45 - Groundwater withdrawn pursuant to an approved remedial action must be withdrawn and used consistent with Title 45, Arizona Revised Statutes.

Construction of New Wells in and Near Remedial Action Sites

ADWR will ensure that new or replacement wells in areas of known groundwater contamination are constructed in such a manner that cross-contamination does not occur. ADWR staff will screen Notices of Intent to Drill that are submitted to ensure that wells are properly constructed. ADWR will establish policies and procedures to implement this directive, including procedures to effectively communicate with well owners and drillers. ADWR will coordinate review of these notices of intent with ADEQ.

Abandonment of Wells In and Near WQARF Sites

ADWR staff will review and evaluate Notices of Intent to Abandon to ensure that abandonment of wells is done in accordance with ADWR rules and that potential for cross-contamination is minimized. ADWR will coordinate review of these notices of intent with ADEQ.

7.5 WATER QUALITY ASSESSMENT

A comprehensive water quality assessment was included in the Third Management Plans. The assessment provided detailed characterization of water quality and an overview of water quality concerns in the PAMA. A water quality assessment for the 4MP will be qualitative. The following sections discuss goals and objectives of the assessment for the fourth management period and water quality of renewable and groundwater supplies in the PAMA.

7.5.1 Assessment Goals and Objectives

The primary goal of this Water Quality Assessment is to provide a qualitative evaluation of groundwater and surface water quality conditions in the PAMA based on the comprehensive assessment performed during the third management period and to identify potential threats to groundwater quality and its link to the regional water supply. The impact of water quality on water resource management has become more important in recent years as water quality standards become more stringent and due to such factors as conjunctive use of water supplies, groundwater management at remediation sites, and increasing levels of public concern.

The municipal, agricultural, and industrial sectors have distinctive demand patterns and water quality requirements. For example, state law prohibits direct use of treated reclaimed water for potable use, but treated reclaimed water is used for turf irrigation, agricultural irrigation, industrial uses, and groundwater recharge. Water high in total dissolved solids (TDS) may be inappropriate for agricultural irrigation, but

may be usable for some industrial applications. Conversely, water that is high in nitrate could provide a good end use for agriculture, but does not meet potable standards. During the fourth management period, ADWR will continue to encourage matching water quality characteristics with appropriate end uses while ensuring compliance with applicable laws and rules for each end use.

7.5.2 Renewable Water Supplies

The renewable water supplies available for use in the PAMA are non-CAP surface water, CAP water, and reclaimed water. The quality of renewable water supplies is discussed in this section.

7.5.2.1 Surface Water Other Than CAP

Most surface water in the PAMA that is not supplied by the CAP is supplied by the San Carlos Irrigation Project, which comes from the Gila River. Other surface water is diverted from the Santa Cruz River by individual landowners with surface water claims or rights to waters in that river.

Surface water quality in the PAMA is generally good. The quality of surface water diverted from the Gila and Santa Cruz rivers is suitable for irrigating the types of crops grown in the PAMA without detrimental effects on production. The quality of surface water in the Santa Cruz River is unknown. Because the Santa Cruz River tends to flow intermittently, depending on the rate of storm runoff, releases from wastewater treatment facilities in Tucson, and tailwater runoff from irrigated fields near Marana, the quality of this water is variable. At the present time, nearly all surface water entering the PAMA is diverted for agricultural irrigation or turf watering purposes.

Other streams in the PAMA are also ephemeral and are usually associated with washes that drain overland flows following heavy local rains. Because the volume of flow in these streams is sporadic and typically results from flooding, the direct use of this water is limited. Although relatively few surface water quality samples have been taken from stormwater runoff and analyzed, water from this source often contains bacteria, parasites, and/or viruses. In order to address contaminants in storm water runoff, the NPDES storm water program was developed to specifically control the amount of storm water pollutant discharges to waters of the United States.

7.5.2.2 Central Arizona Project Water

The largest surface water supply available in the PAMA is CAP water, which is diverted and conveyed from the Colorado River in a primarily open canal. The direct delivery of CAP water for municipal water supply has not occurred in the PAMA as of 2016. Most CAP use in the PAMA is for agricultural irrigation or turf-related watering purposes, however, some municipal water providers have occasionally recovered stored CAP water from wells and delivered it to their customers via their groundwater distribution systems. Use of CAP water at Groundwater Savings Facilities, where CAP water is used in-lieu of pumping groundwater by agricultural water users, and underground storage and recovery of CAP water pursuant to the Underground Water Storage, Savings and Replenishment Program, are described in Chapter 8 of this plan.

7.5.2.3 Reclaimed Water

A.R.S. § 45-101(4) provides the following definition for “reclaimed water” (also called effluent):

Water that has been collected in a sanitary sewer for subsequent treatment in a facility that is regulated pursuant to Title 49, Chapter 2. Such water remains reclaimed water until it acquires the characteristics of groundwater or surface water.

Sanitary sewers are defined as of any pipe or other enclosed conduit that carries any waterborne human wastes from residential, commercial, or industrial facilities (A.R.S. § 45-101(8)).

Reclaimed water treated at municipal wastewater treatment plants in the PAMA is suitable for turf irrigation, agricultural irrigation, sand and gravel washing, and other industrial applications. Wastewater reuse rules are developed by ADEQ and establish standards for various classes of wastewater. Wastewater discharges require an AZPDES permit to ensure that water quality parameters are being met.

Major wastewater treatment facilities in the PAMA are owned and operated by the City of Casa Grande, the City of Coolidge, the City of Eloy and the Town of Florence. All of these entities except the Town of Florence dispose of the treated reclaimed water by discharging it into streams. Reclaimed water generated by the Town of Florence is used for agricultural irrigation. (See:

http://www.azwater.gov/azdwr/StatewidePlanning/WaterAtlas/ActiveManagementAreas/documents/Volume_8_PIN_final.pdf) (ADWR, 2010).

Secondary reclaimed water, which is treated to AZPDES permit standards, usually contains Total Dissolved Solids (TDS), nitrate, sulfate, metals and bacteria at concentrations higher than those present in public water supply systems with groundwater sources. Wastewater reuse rules are developed by ADEQ and establish parameters for wastewater reuse options.

Constructed wetlands can be developed to further enhance the treatment of reclaimed water and to pretreat water prior to recharge or reuse. Vegetation and microbial activity in wetlands along with filtration of reclaimed water through the vadose zone (soil aquifer treatment) improves the quality of water containing high concentrations of nitrate and organic carbon. Constructed wetlands are occasionally used as a treatment for lower quality surface waters and agricultural return flows. Wetland projects are also being evaluated to determine their effectiveness as enhanced treatment for reclaimed water discharges to meet more stringent AZPDES permit requirements. In addition to improving water quality, wetlands enhance wildlife habitat and serve as an educational and recreational resource for the community.

7.5.3 Groundwater Supplies

Groundwater is one of the most important sources of water in Arizona. Most of the groundwater in the PAMA is of acceptable quality for most uses. However, some groundwater areas have been degraded as a result of contamination.

The introduction of contaminants into aquifer systems degrades groundwater quality and may pose a threat to public health and the environment. Contaminants can migrate into areas of potable groundwater due to groundwater pumping or regional groundwater flow patterns. Many areas of the PAMA are projected to remain dependent on groundwater pumping, thereby potentially causing contaminant migration. ADWR's role in managing potential contaminant migration is through involvement in site-specific and non-site-specific water quality management.

Groundwater that has been degraded has limited direct beneficial uses due to chemical, biological, or radiological contamination and may have high treatment and delivery costs associated with its use. Despite these limitations, ADWR considers poor quality groundwater to be a valuable resource for future water management and encourages appropriate uses of this water supply. Matching the highest beneficial use with poor quality groundwater is an important aspect of water management. Frequently, poor quality groundwater is remediated and re-injected into the aquifer because it is not economically feasible to convey the treated water to another location for a higher beneficial use.

Recognizing that there may be groundwater quality impacts resulting from surface water recharge, the EPA requires states to develop a rule for groundwater under the influence of surface water. ADEQ has adopted a rule (A.A.C. R18-4-212), requiring that groundwater under the direct influence of surface water

withdrawn from recharge facilities should undergo more extensive water quality analysis and treatment than groundwater. This additional analysis and treatment may increase the costs associated with the development and operation of underground water storage facilities. See Chapter 8, section 8.3.4, for further discussion of recharge water quality challenges.

7.6 FUTURE DIRECTIONS

ADWR's long-range plans for groundwater quality management will focus on two areas: (1) evaluation of groundwater quality challenges on a site and non-site-specific level to understand the impact of groundwater quality challenges on water resource management on a broader level and (2) preservation of the PAMA management goals with emphasis on implementing incentives to use remediated groundwater.

7.6.1 Non-Site-Specific Water Quality Management

Non-site-specific groundwater quality management refers to groundwater quality management activities that may occur in general areas located outside of identified remedial action site boundaries. To address and mitigate dispersed contamination over large areas, a broader management strategy is needed. Areas that may need more intensive management may include those where public or private supply wells have been or may be affected by contamination. For instance, areas that are in the vicinity of major population centers or agricultural areas can be affected by contamination, especially if large volumes of groundwater are pumped, creating cones of depression.

Changes in groundwater levels can result in degradation of aquifer conditions. Rising water levels in areas of known landfills or other areas that have suspended contaminants in the vadose zone (e.g. leaking USTs) have the potential for contaminant migration. Declining groundwater levels can impact aquifer water quality. Groundwater recharge projects can also affect aquifer conditions.

Groundwater quality management on a non-site-specific scale can enhance water management activities in sub-regional areas. Taking action to identify source groundwater quality and develop area-specific plans to match water quality with intended uses combined with strategies to evaluate and mitigate the effects of contamination in sub-regional areas can help preserve good quality groundwater for current and future uses. Coordination with ADEQ and with affected stakeholders ensures an informed approach. Contaminant management on a non-site-specific scale can be achieved in such a way that it would not affect rights to groundwater, well ownership, delivery responsibilities, or existing permits.

7.6.2 Preservation of PAMA Management Goals

The WQARF reform enacted in 1997 and amended in 1999 was designed to encourage the remediation of groundwater that has limited or no use due to contamination. Pump-and-treat groundwater remediation activities are anticipated to continue to be the predominant means of remediation during the fourth management period. Previously unavailable sources of groundwater from contaminated areas may be put to beneficial use during the fourth management period and thereafter.

Remediated groundwater withdrawals associated with WQARF, CERCLA, DOD, RCRA, and voluntary site cleanups may continue or increase. In the fourth management period, ADWR will monitor water levels, land subsidence and effects on local water providers at remedial project sites in areas of intensive pumping. While ADWR supports the remediation of contaminated groundwater, it also seeks to preserve the water management goals of the PAMA. Water quality management is a long-term process that is expected to continue far beyond the duration of the fourth management period. Remedial activities will likely continue over the long-term and will likely result in considerable volumes of groundwater being pumped, treated, and subsequently used or reinjected.

The net effect of continued remediated groundwater withdrawals could result in a substantial increase in the overall volume of groundwater used within the AMAs. Proper water quantity and water quality management will be required to ensure that groundwater use created as a result of activities at remedial action sites does not negatively impact the water management goals of the AMAs. ADWR will seek to preserve the intent of the Code and the AMA management goals while cooperating with EPA, ADEQ and other water resource agencies to promote rational groundwater quality management.

7.7 SUMMARY

Most groundwater supplies in the PAMA are of acceptable quality for most uses. However, human activity and natural processes have resulted in the degradation of groundwater quality in some areas to the extent that it is unusable for direct consumption for many purposes. The extent and type of contamination vary by location and land use activities. Contamination of groundwater in the PAMA has generally been caused by human activity. Water supplies contaminated with constituents must also be properly treated prior to use for drinking water supplies. Beneficial end uses of lower quality water must be economically feasible.

As WQARF activities continue, addressing water management challenges such as available supply and reuse options helps to ensure a long-term water supply of adequate quality. The ability to recognize specific groundwater management requirements for contaminated and degraded aquifer conditions is also important as the demand for water increases.

The WQARF reform legislation created an incentive for the use of groundwater withdrawn in accordance with approved remedial action projects pursuant to Title 49, Arizona Revised Statutes, or CERCLA. It provided that generally such groundwater must be accounted for consistent with accounting procedures used for surface water for purposes of determining compliance with management plan conservation requirements and that the use of certain volumes of such groundwater is consistent with achievement of the management goal of the AMA until the year 2025. ADWR has amended its AWS Rules to conform to these provisions, and also considers water quality challenges more fully in its underground water storage program.

ADWR's Groundwater Permitting and Wells Section provides support to the PAMA on challenges related to WQARF cleanup activities assisting ADWR in carrying out its commitment to work closely with ADEQ to resolve groundwater quantity and quality challenges throughout Arizona.

ADWR will continue to be directly involved in other remedial activities and management action plans such as those associated with WQARF and other cleanup sites. This will ensure that remedial activities meet ADWR's water management objectives and are consistent with the PAMA's water management goal.

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